

Correlation between PPAR γ protein expression level in granulosa cells and pregnancy rate in IVF program

Mehdi Sahmani¹ Ph.D., Reza Najafipour² Ph.D., M.P.H., Laya Farzadi³ M.D., Ebrahim Sakhinia¹ Ph.D., Masoud Darabi¹ Ph.D., Vahideh Shahnazi³ B.Sc., Amir Mehdizadeh¹ M.Sc., Maghsod Shaaker¹ M.Sc., Mohammad Noori⁴ Ph.D.

¹ Department of Biochemistry and Clinical Laboratories, Faculty of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran.

² Department of Clinical Biochemistry and Molecular and Cellular Research Center, Ghazvin University of Medical Sciences, Qazvin, Iran.

³ Women's Reproductive Health Research Center, Alzahra Hospital, Tabriz University of Medical Sciences, Tabriz, Iran.

⁴ Drug Applied Research Center, Tabriz University of Medical Sciences, Tabriz, Iran.

Corresponding Author:

Mohammad Noori, Drug Applied Research Center, Tabriz University of Medical Sciences, Tabriz, Iran.

Email: mmdnoori@gmail.com

Tel/fax: (+98) 9143364666

Received: 6 January 2011

Revised: 18 April 2011

Accepted: 18 May 2011

Abstract

Background: Peroxisome proliferative-activated receptors (PPARs) are nuclear receptors that involved in cellular lipid metabolism and differentiation. The subtype γ of the PPAR family (PPAR γ) plays important roles in physiologic functions of ovaries.

Objective: To determine correlation between PPAR γ protein level in granulosa cells and pregnancy rate in women undergoing in-vitro fertilization (IVF) treatment.

Materials and Methods: In this cross-sectional study, twenty-five samples of granulosa cells were collected from women referred to an IVF treatment center. PPAR γ protein expression level in granulosa cells was determined in comparison with β -actin level as control gene with Western blot test. Laboratory pregnancy was determined by a rise in blood β -hCG level fourteen days after embryo transfer. Correlation analyses were used to test for associations between the oocytes and pregnancy occurrence as outcome variables and PPAR γ protein expression level.

Results: Correlation analysis indicated that there was no significant relationship between granulosa cells PPAR γ protein level with IVF parameters including number of matured oocytes and the ratio of fertilized to matured oocytes. Comparison of granulosa cells PPAR γ protein level with positive and negative laboratory pregnancy revealed also no significant relationship.

Conclusion: According to the results of this study, PPAR γ protein level in granulosa cells could not be directly correlated to the success rate of IVF.

Key words: In-vitro fertilization, Peroxisome proliferative-activated receptor γ , Granulosa cells, Pregnancy rate.

Introduction

Different studies show that various factors may potentially affect IVF success rate (1). PPAR γ (peroxisome proliferative- activated receptor gamma) has been known as an important regulatory factor in fertility (2). PPAR γ gene is located on the short arm of the chromosome 3 and consists of 9 exons with more than 100 kb (2). PPAR γ is a member of intracellular (nuclear) receptors and belongs to the steroidal /thyroidal receptor family (3).

After ligand to receptor binding and forming active complex, receptor can attach to some portions of DNA, called PPAR response element (PPARE) to modify gene expression level (3). Some natural ligands such as unsaturated fatty acids or synthetic agents act as activator of PPAR family (3, 4). Subgroup γ of PPARs plays important roles in gluconeogenesis, biosynthesis, deposition

and catabolism of lipids. PPAR γ increase insulin sensitivity and as a result decrease blood glucose in patients with type II diabetes mellitus (3). It has been shown that decreased PPAR γ activity relates to decreasing hormone biosynthesis in ovaries (5). Antoine *et al* (6) showed that PPAR γ acts as modifier gene in general population in contrast to patients with polycystic ovary syndrome (PCOS). Expression of this gene has been detected in different stages of folliculogenesis and the highest expression level has been reported after follicle releasing and LH surge (4).

Recent studies showed that PPAR γ plays an important role in ovary tissue changes during ovulation, as well as facilitation of ovulation in the every cycle of menstruation in mammals (2). Fan *et al* (7) showed that PPAR γ blocks androgen conversion to estradiol by inhibiting the expression of aromatase. The production of estradiol by ovaries plays an important role in uterine